pit No. 2 with a thickness of six feet. The deposit of bones was from one to two feet in thickness. All the more porous bones of *Dinornis*, such as the pelves, sterna, ribs, and vertebræ, were, with the exception of a few vertebræ, in an advanced state of decay. I should judge that there were double the amount of bones in this pit that there were in the first. The bones of *Cnemiornis* appeared to have resisted decay better than those of *Dinornis*. I do not think that it would be far from the mark to say that fully one-third of the birds in this pit were *Cnemiornis*, one-third adult *Dinornis*, chiefly of the smaller species, and one-third young Moas. I only saw one long metatarsus, and that belonged to a young bird.

The bones were deposited in peat and silt, the same as in the first pit. Both pits are now washed away by the diggers, and during the progress of washing I kept an eye to the affair. I traced the gutter from which the spring water rose in the first pit, to pit No. 2, and the same red shingly gutter continues on up the flat. This establishes, beyond a doubt, in my mind, that the first pit was a spring; and further, that pit No. 2 had at some far remoter period been also a spring fed from the same source. A like discovery may never be made again.

Art. XLVII.—*On Insects injurious to the Kauri Pine* (Dammara australis.)

By Captain Broun.

[*Read before the Auckland Institute, July 3rd, 1876.*]

It has often occurred to me that if entomologists were to communicate their knowledge of the insect fauna of New Zealand by the publication of papers descriptive of the habits of some of the more important groups, the subject would be treated in a manner more attractive to the members of the Institute, as well as other readers of its "Transactions," than could be done by the mere record of the number of species inhabiting these islands. Moreover, the perusal of even the best classified list would afford but little information respecting the modes of life of numbers of insects which play an important part in the economy of nature; and which, it is desirable, should be fully understood by those most concerned.

I am well aware that certain prejudices exist with reference to this subject, and that there are many who rather affect to despise that branch of natural history from which entomologists derive their chief delight; but if such were to have the matter presented to them so as to demonstrate the necessity of acquiring some knowledge of the functions of certain tribes of insects which materially affect their interests, I rather think their indifference might be changed to deep concern.

The difficulties which have hitherto beset New Zealand entomologists, desirous of recording facts illustrating the habits of insects, are now being gradually removed; it will be sufficient for my purpose merely to allude to one, and perhaps the most difficult to surmount, viz., their inability to determine accurately the name of any particular species which may have been the subject of special observation.

The remarks offered in the present instance will, I trust, convey a tolerably correct idea of certain beetles that are known to infest Kauri timber.

The Kauri Pine *(Dammara australis)*, when in a healthy-growing state, so far as I have had opportunity of observing it, seems capable of resisting the attacks of every New Zealand insect with which I am acquainted, though subsequent researches may prove it vulnerable to those that are being gradually introduced, as, for example, *Otiorhynchus sulcatus*, an European species of the weevil tribe, of which I captured one individual whilst it was feeding, amongst the roots of the stunted herbage near the summit of Mount Eden (Auckland).

The gum, after the tree has been cut down and the bole divided into logs, serves as a protection against the ravages of numbers of insects generally disregarded by casual observers, but which, when favourable opportunities offer, soon discover themselves to even the most inexperienced individual, by the palpable deterioration in the value of the timber, caused by their destructive propensities.

Perhaps the most conspicuous, and, to owners of Kauri forests, most detested beetle, is a species recently described by Mr. T. V. Wollaston, under the name *Xenocnema spinipes*, one of the most important yet yielded by these islands, in a scientific point of view, inasmuch as it connects, in the most complete manner, the family *Scolytides*, with the other groups of the *Curculionidæ*.

So long as the Kauri logs retain their gum undeteriorated, *Xenocnema spinipes* evinces no partiality for them, but no sooner does the action of the atmosphere cause its partial decomposition, and destroy, or even lessen, the adherence of the bark, than this insect immediately begins its insidious operations; in fact, the logs are then in a condition exactly suited to the habits of this peculiar weevil.

The first operation consists in forming irregular galleries under the bark, wherein the female at once deposits her eggs, which, so far as I have been able to ascertain, assume the next stage of their metamorphoses in an incredibly short space of time, as I have found both the perfect beetles and larvæ industriously engaged in piercing the sap-wood of logs that could not have been many weeks on the ground.

If the logs were permitted to remain undisturbed for many months, I have no hesitation in asserting that *Xenocnema spinipes*, in the larvæ and perfect states, would render them comparatively useless for commercial purposes, so far at least as ship and house building are concerned.

I have noticed shingles split from heart of Kauri, *en route* from districts north of Auckland, and even doors of dwelling-houses, completely perforated in several places; data clearly proving that it reaches even the centre of the logs. Generally, however, the practice which obtains amongst bushmen of rolling the logs into the adjacent creeks, down which they are afterwards driven during freshes to the "booms," as soon as possible, prevents this destructive weevil from penetrating beyond the sap-wood.

I have already indicated that the shelter of the bark appears to be a necessity to this insect during the earlier stages of its operations; it may, therefore, be inferred, that if bushmen were required to remove the bark as soon as the tree had been cut down, *Xenocnema spinipes* would not have the power of materially injuring the timber. The only other practicable method I can propose for the preservation of the timber is to "drive" the logs down to deep water at once; but, as this proceeding depends entirely on the weather, it can only be resorted to under favourable circumstances.

Although *Xenocnema spinipes* has its habitat in Kauri forests, it may be met with many miles distant from the nearest tree of that species, owing chiefly to its powerful flight when on the wing. I have seen specimens occasionally on the windows of buildings erected near the sea-shore, as well as on the foliage of isolated plants, but I have not, under these conditions, observed any damage to wood or foliage that could be attributed to its action.

This beetle varies greatly in the form of its rostrum, and though the colour and sculpture are constant wherever visible, yet I have remitted several specimens to British entomologists, with notes as to habitat, etc., in the hope of having their assistance in determining whether this important creature is in reality of one variable species, or, as I believe, consists of the genus *Xenocnema*, having two or more distinct species.

The insect which next claims attention is a new species of the *Xantholinidæ*, named by Dr. Sharp of Dumfriesshire, "*Metoponcus brouni*," which I discovered under the bark of Kauri logs, in company with the weevil already alluded to, during the winter of 1875; and found on other occasions, as well as during other seasons, subsequently. This beetle, however, does not injure the timber any more than two or three species of the genus *Cryptanurpha*, or the numerous centipedes found associated under Kauri bark, and all of which, I need scarcely say, are destroyed when the logs arrive at deep water. I regret that the time at my disposal did not enable

me to make a minute examination with my pocket lens, but had time been sufficient, the assistance of a miscroscope, an indispensable instrument when investigating the habits of insects, as well as their structural characters, was not within reach. I could only note that the flattened elongated form of the larva was one admirably adapted to its habitat.

The beetle which continues the work of destruction after the others have been disposed of, is "*Dryoptherus bi-tuberculatus*," a species of the *Cossonides*, so named by White ("Voyage, '*Erebus*' and '*Terror*,'" Insects) but its generic name will be eventually altered, the insect having been referred to a genus to which it has no near affinity. It is tolerably abundant in districts possessing Kauri forests, and is occasionally found upon the foliage of other trees and shrubs, when it is usually enveloped in, or only partially covered with, a thick white pubescent coating, which has disappeared by the time it is found embedded in Kauri logs.

Dryoptherus bi-tuberculatus seems indifferent to the shelter of the bark, so essential to the other weevil whose habits have been described, and being more fastidious, requires the almost complete decomposition of the gum, in order that suitable food may be available for its offspring. Logs in the condition indicated are pierced with holes corresponding to the size of the insect, and the eggs deposited therein; when these have arrived at the larval stage of their existence, the real work of destruction begins in earnest, and is carried on uninterruptedly by the perfect insect, until the entire bulk of the sap-wood is so completely perforated as to resemble honey-comb.

Fortunately, however, it is generally only the outer portions of this valuable tree which are thus rendered valueless as a marketable commodity, and it is satisfactory to be assured that only those logs that are negligently treated, suffer the injury which this insect is so well capable of inflicting.

The logs having been passed through the saw-mill, and used in house building, would, it might be supposed, be exempt from further attacks by insects of the weevil tribe; such a supposition would be incorrect, as I have noticed unpainted weather-boards of buildings in the town of Auckland with small cylindrical holes bored into them in such a way that one might cast the blame on *Xenocnema spinipes*; in this instance, however, it is not the delinquent, the real perpetrator of the mischief being a species of the *Scolytides*, which is, as yet, I believe, nondescript.

It might be imagined that the depredations committed by the weevils already mentioned, would be sufficient proof of the destructive propensities of insects, but I am assured by Mr. John Macfarlane, the Manager of the Tairua Saw-mills Company's property, that a large "grub," said to be eaten with avidity by the Maoris, frequently perforates the solid wood. I have not had an opportunity of personally inspecting such logs, but from the

description given to me I suspect the so-called grub to be the larva of our largest longicorn beetle, *Prionoplus reticularis*, which I know passes three or four years of its existence in the larval state, in logs of various trees.

The investigation I have bestowed upon this subject within the last two years clearly establishes the value of the gum as a temporary protection against the attacks of indigenous *Coleoptera*, which would, but for its presence, inflict an incalculable amount of pecuniary injury, not only on owners of Kauri forests, but also on whole communities engaged in the preparation of this timber for use in a variety of manufactures.

I now present to the Institute, specimens of the beetles adverted to in this paper, and as pieces of logs in the damaged conditions specified, will serve more fully to illustrate the subject, I now deposit in the Museum the piece of a board sawn out of a Kauri log, showing the injury done by *Xenocnema spinipes*, as also a small portion cut from another log as an example of that inflicted by *Dryoptherus bi-tuberculatus*.

When visiting localities which were being denuded of this valuable tree, the conviction was at once forced upon me that the practice which obtains of selecting the bole of the tree only for use involved a serious loss, but a consideration of the circumstances compels one to admit that the remainder of the tree cannot be profitably utilized either for fencing-posts or firewood, unless a forest has convenient water-carriage, or is so situate that inexpensive bush-tramways could be constructed to a point within easy reach of a good market, but if colonial agriculturalists were more cognizant of their real interests, they would devise means for converting the refuse timber, not only into a valuable ingredient of the manure heap, but even of the soil itself.

The money so often lavishly invested in the purchase of foreign guano might be much more beneficially employed in reducing the waste timber to charcoal, which, by its remarkable property of condensing and absorbing ammonia, would fully answer the purpose of ammoniacal manure, particularly on most of the clay lands that so often refuse to yield more than a scanty crop. Moreover, it has been incontestably proved that charcoal induces healthy growth in diseased plants.

Were farmers to satisfy themselves by experiments on a small scale, such as adding this substance to one part of a manure heap, and leaving the remainder to be deprived of its most useful gases and liquids as is usually done, and then use the two portions separately, the results would be so obvious that further action in the matter might be safely left to them.

If steps were taken for utilizing the timber now allowed to decay, the saw-dust produced at the mills ought also to be charred—an operation which could be readily effected by any intelligent engineer, by constructing

an iron receptacle for it in proximity to the mill furnace; or it might be charred by means of freshly-burnt lime, which, in conjunction with the charcoal, would form a compound particularly valuable on a clay soil, but more especially when its application had been preceded by an efficient system of drainage.

These concluding remarks may be regarded rather as an addenda than strictly within the scope of what was originally intended as an entomological paper, but as some of the suggestions may invite discussion on the subject, and perhaps ultimately lead enterprising individuals to desire practical methods for reducing the amount of waste now permitted in all our forests, public and private, their introduction may be excused.

Art. XLVIII.—*Descriptions of new species of* Coleoptera. By Captain Broun

[*Read before the Auckland Institute, 7th August, 1876.*]

Anchomenus punctulatus.

Head, shining black; anterior, as far as eyes, rugose; less so on the vertex; remainder faintly punctured. Thorax, sub-quadrate, broader in front; anterior angles, obtuse; lateral margins, moderately reflexed; a broad, oval, tranverse line near anterior margin; another near the base; both connected by a longitudinal line; a deep impression near each posterior angle; superfices with finely impressed transverse lines, most conspicuous near the base; colour, black. Elytra, dark blue; sub-ovate, somewhat depressed; striate; the nine lines slightly punctured; a row of shallow impressions on the interstices between the eighth and ninth striæ, most closely placed near posterior femoræ; lateral margins slightly reflexed of a faint reddish hue; suture, ferruginous. The whole surface of the elytra is very finely punctured. Antennæ, palpi, and tarsi, ferruginous Femoræ and tibiæ, fuscous. Length, 7 lines.

Habitat: Auckland.

Trichosternus hispidus.

Colour, deep black, except the palpi and tarsi, which are ferruginous. Antennæ, fourth to eleventh joints, pilose. Head, with an irregular H-shaped impression in front; two round foveæ near inner margin of each eye, from each of which proceeds an erect ferruginous bristle. Thorax, quadrate, rather flat; somewhat contracted and sinuate behind; wider than head; anterior angles, rounded; posterior, obtusely pointed; a deeply impressed line extends from the base nearly to anterior margin; a large, deep, elongate fovea near each posterior angle; lateral margins, reflexed, two